No. 200100257

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Washington State University Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Zak'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this ninth day of April, in the year two thousand two.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
WASHINGTON STATE UNIVERSITY RESEARCH FOUNDATION

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
WA7850

3. VARIETY NAME
Zak

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
1610 NE Eastgate Blvd.
Pullman, WA 99163
U.S.A.

5. TELEPHONE *(Include area code)*
509.335.5526

6. FAX *(Include area code)*
509.335.7237

FOR OFFICIAL USE ONLY

PVPO NUMBER
200100257

FILING DATE
August 10, 2001

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Corporation

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
Washington

9. DATE OF INCORPORATION
July 7, 1939

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
Leona C. Fitzmaurice
Washington State University Research Foundation
1610 NE Eastgate Blvd.
Pullman, WA 99163

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ 2705.00
DATE 8/10/2001

CERTIFICATION FEE:
$ 320.00
DATE 2/22/02

11. TELEPHONE *(Include area code)*
509.335.4363

12. FAX *(Include area code)*
509.335.7237

13. E-MAIL
fitzmaur@wsu.edu

14. CROP KIND *(Common Name)*
Spring wheat

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum L.

16. FAMILY NAME *(Botanical)*
Gramineae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

a. ☒ Exhibit A. Origin and Breeding History of the Variety
b. ☒ Exhibit B. Statement of Distinctness
c. ☒ Exhibit C. Objective Description of Variety
d. ☒ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☒ Filing and Examination Fee ($2,705), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☐ YES *(If "yes", answer items 20 and 21 below)* ☒ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☐ YES ☐ NO
IF YES, WHICH CLASSES? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, *etc.* ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☒ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☒ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER
Leona Fitzmaurice

NAME *(Please print or type)*
Leona Fitzmaurice

CAPACITY OR TITLE
Executive Director

DATE
Aug. 09, 2001

SIGNATURE OF OWNER

NAME *(Please print or type)*

CAPACITY OR TITLE

DATE

INSTRUCTIONS 200100257

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $2,705 ($320 filing fee and $2,385 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

NOT APPLICABLE

22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

Sold as Foundation Seed on August 15, 2000.

23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

NOT APPLICABLE

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed/ls-sd.htm

EXHIBIT A - ORIGIN AND BREEDING HISTORY

'ZAK'

1. **Genealogy**: Pavon "S"/5/PI167822/CI13438 113-6//Idaed/Marfed 68-5/4/Lemhi 66/3/Yaktana 54A*4//Norin 10/Brevor/6/Walladay/7/PI506355/8/Treasure

2. **Stages of Selection and Multiplication**:

1988: Final cross made: WSU research land.

1989: F_1 generation; WSU research land; all plants uniform.

1990: F_2 bulk population; WSU research land; selected 100 random spikes; segregating for maturity, plant height, and disease resistance.

1991: F_3 bulk population; WSU research land; no selection applied; segregating for maturity, plant height, and disease resistance.

1992: F_4 bulk population; WSU research land; selected 150 random spikes; segregating for maturity, plant height, and disease resistance.

1993: F_5 head row (F_4-derived); WSU research land; selected based on appropriate plant height, maturity, and disease resistance; no segregation within the single row.

1994: F_6 Single Plot Nursery (tested as W9400154); WSU research land; selected based on appropriate plant height, maturity, field resistance to leaf and stripe rust, grain protein content, test weight, grain yield, and milling/baking quality; no segregation within the plot.

1995: F_7 Preliminary Yield Trial; WSU research land; selected based on appropriate plant height, maturity, field resistance to leaf and stripe rust, grain protein content, test weight, grain yield, and milling/baking quality; no segregation within the plot.

1996: F_8 State Advanced Yield Trial; WSU research land; selected based on appropriate plant height, maturity, field resistance to leaf and stripe rust, grain protein content, test weight, grain yield, and milling/baking quality; no segregation within the plot.

1997: F_9 WSU Commercial Variety Trial; Tri-State Variety Trial (WA, OR, ID), (tested as WA007850); selected based on appropriate plant height, maturity, field resistance to leaf and stripe rust, grain protein content, test weight, grain yield, and milling/baking quality; no segregation within the plot.

EXHIBIT A - ORIGIN AND BREEDING HISTORY, cont.

1998: F_{10} WSU Commercial Variety Trial; Tri-State Variety Trial (WA, OR, ID), Nursery, Western Regional Performance Nursery; selected based on appropriate plant height, maturity, field resistance to leaf and stripe rust, grain protein content, test weight, grain yield, and milling/baking quality; no segregation within the plot.

1999: F_{11} WSU Commercial Variety Trial; Western Regional Performance Nursery; selected based on appropriate plant height, maturity, field resistance to leaf and stripe rust, grain protein content, test weight, grain yield, and milling/baking quality; no segregation within the plot.

Individual F_{10} heads (1700) of Zak were hand threshed and separately planted in 10 ft. rows (headrows) in March, 1999 for the production of Breeder seed. Breeder seed was bulk harvested from a reselection of the headrow block, based on phenotypic uniformity, in August, 1999 and planted in March, 2000 for Foundation seed production.

2000: WA007850 released as the cultivar 'Zak': PI607839

3. Evidence of uniformity and stability:

Zak has been observed to be stable and uniform with respect to plant morphology since 1993 as an F_4-derived line. This represents seven generations (1993-1999) through which this stability and uniformity have been observed.

4. Variants during reproduction:

Zak contains a red wheat variant that was observed at a level of 1 to 4 seeds per 1000 g in pre-breeder, breeder and foundation seed increases.

EXHIBIT B. – NOVELTY STATEMENT

Zak is most similar Wawawai, which it is intended to supplant in the intermediate to high rainfall (> 18 inches of average annual precipitation), non-irrigated production regions of eastern Washington based on its tolerance to the Hessian fly, and to Alpowa, the primary soft white spring wheat in commercial production in Washington state.

A. Agronomic Characteristics

Zak can be differentiated from Alpowa and Wawawai based on heading date and height differences as described below.

1. Zak is later in heading date than both Alpowa (1 day) and Wawawai (2 days) under Washington State field conditions as shown in Table B1 below.
2. Zak is 3 inches shorter than Wawawai and equal to Alpowa under Washington State field conditions as shown in Table B1 below.

Table B1. Heading date and plant height of Zak, Alpowa, and Wawawai in commercial variety trials from 6 locations in Washington State in 1998. LSD is based on all entries grown in the trial.

		Location						
Trait	Variety	Lind	Ritzville	Pomeroy	Pullman	Fairfield	Royal Slope	Avg.
Heading	Zak	155	162	172	169	178	153	165
(days after	Alpowa	154	160	171	170	178	152	164
Jan 1)	Wawawai	152	158	172	167	175	152	163
	LSD (0.10)	0.9	0.6	0.7	0.7	0.8	1.0	
Height	Zak	34	29	31	34	35	40	34
(inches)	Alpowa	33	30	32	35	36	37	34
	Wawawai	35	34	35	35	39	42	37
	LSD (0.10)	1.2	1.4	1.1	1.4	1.7	1.5	

B. Genetic Characteristics

The novelty of Zak is demonstrated by high-molecular weight (HMW) glutenin profiles (Payne et al. 1983) and microsatellite fingerprint data that differentiate Zak, Alpowa, and Wawawai. Zak's HMW glutenin profile is [2* 6+8 2+12], whereas both Alpowa, and Wawawai are [null 7+9 5+10] (Figure 1).

The microsatellite *Xgwm174* is located on chromosome 5DL, between RFLP loci X*cdo*57 (proximal) and X*cdo*1508 (distal) (Röder et al., 1998). Amplification of *Xgwm174* reveals a 244 bp allele in Zak, whereas a 230 bp and 232 bp allele is present in Alpowa and Wawawai, respectively (Figure 2).

References:

Payne, PI, and GJ Lawrence. 1983. Catalogue of alleles for the complex gene loci, Glu-A1, Glu-B1, and Glu-D1, which code for high-molecular-weight subunits of glutenin in hexaploid wheat. Cer. Res. Comm. 11:29-35.

Röder et al. 1998. A microsatellite map of wheat. Genetics 149:2007-2023.

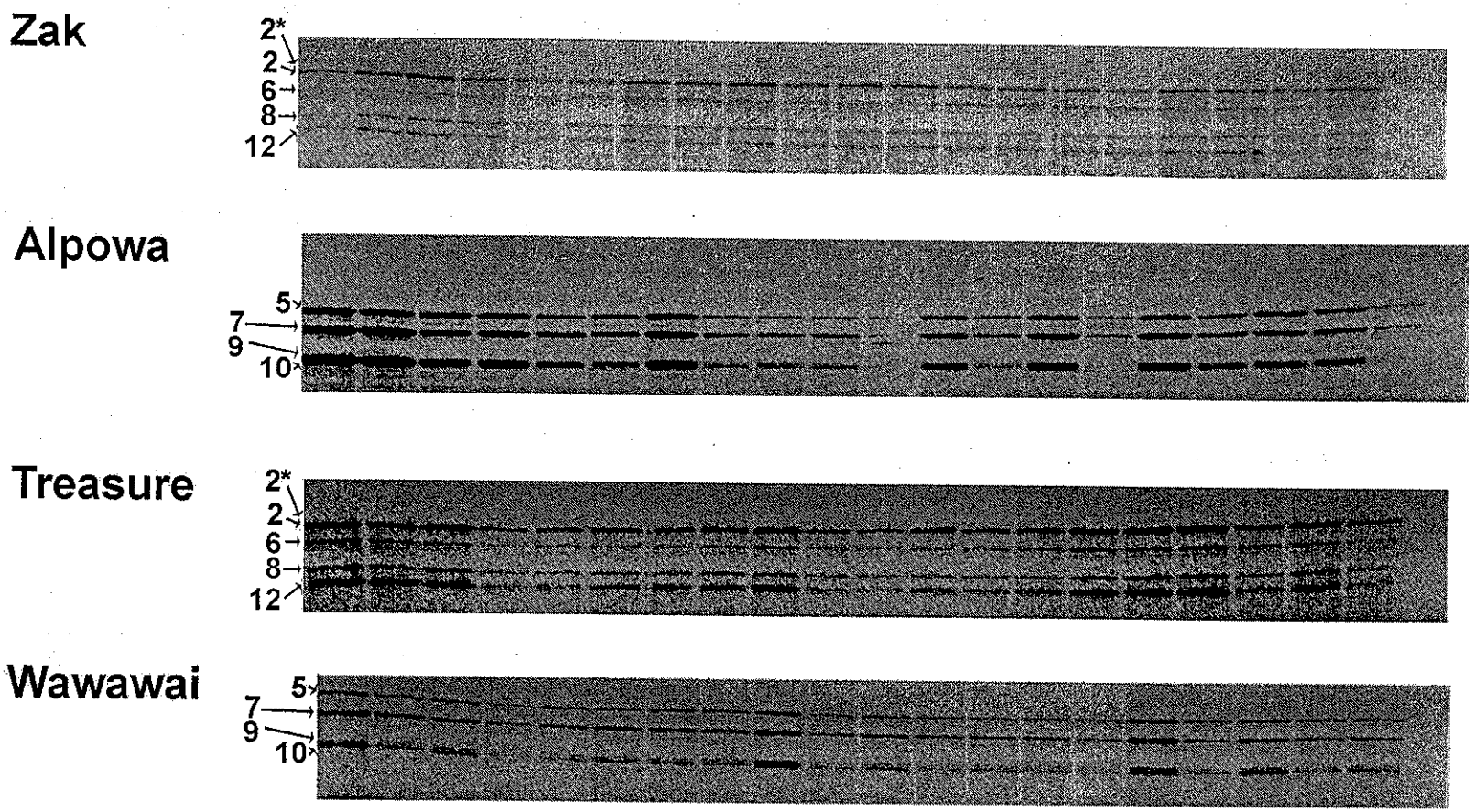

Figure 1. High-molecular weight glutenin profiles of bulked (first lane) and individual progeny extracts of Zak, Alpowa, Treasure and Wawawai kernels. Proteins were resolved via SDS-PAGE, and visualized using Coomassie Brilliant Blue (Payne and Lawrence, 1983).

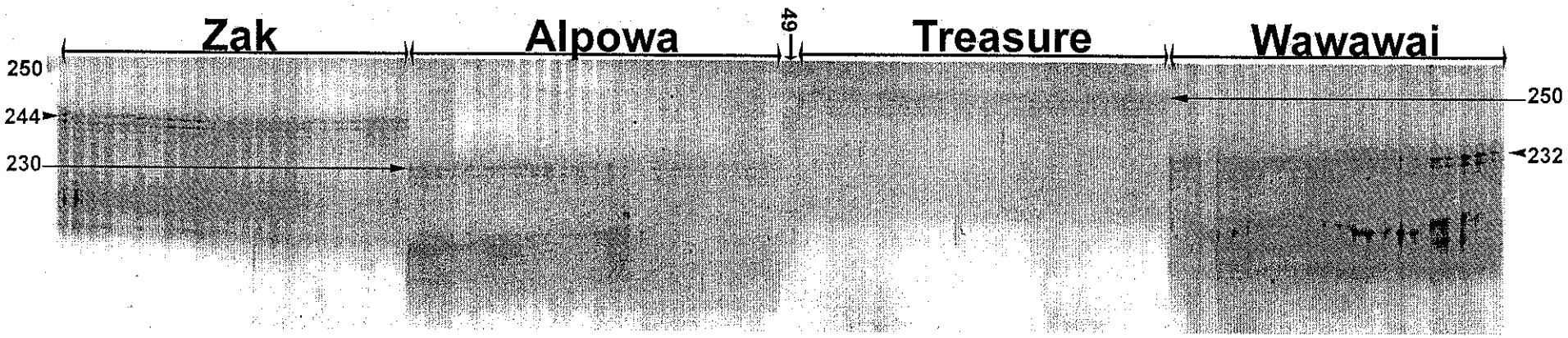

Figure 2. Microsatellite locus Xgwm174 amplified from bulked (first lane of each cultivar) and individual progeny of Zak, Alpowa, Treasure and Wawawai. DNA was obtained from leaf disc extracts; amplified products were resolved in denaturing polyacrylamide and visualized with standard silver stain techniques. Lane #49 contains a reload of the Zak bulk for reference.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S)	FOR OFFICIAL USE ONLY
Washington State University Research Foundation	PVPO NUMBER 200100257
ADDRESS (*Street and No. or RD No., City, State, and Zip Code*)	VARIETY NAME Zak
1610 NE Eastgate Blvd. Pullman, WA 99163 U.S.A.	TEMPORARY OR EXPERIMENTAL DESIGNATION WA007850

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. [0][9] or [0][9]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used:
Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

[1] 1=Common 2=Durum 3=Club 4=Other (SPECIFY) : _____

2. VERNALIZATION:

[1] 1=Spring 2=Winter 3=Other (SPECIFY) : _____

3. COLEOPTILE ANTHOCYANIN:

[1] 1=Absent 2=Present

4. JUVENILE PLANT GROWTH:

[2] 1=Prostrate 2=Semi-erect 3=Erect

5. PLANT COLOR (boot stage):

[2] 1 = Yellow-Green 2 = Green 3 = Blue-Green

6. FLAG LEAF (boot stage):

[2] 1 = Erect 2 = Recurved [2] 1 = Not Twisted 2 = Twisted

7. EAR EMERGENCE:

[0][1] Number of Days Earlier Than Penawawa *

[0][3] Number of Days Later Than Wawawai *

8. ANTHER COLOR:

[1] 1 = Yellow 2 = Purple

9. PLANT HEIGHT (from soil to top of head, excluding awns):

[0][5] cm Taller Than Penawawa *

[0][7] cm Shorter Than Wawawai *

* Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

10. STEM:

A. ANTHOCYANIN

[1] 1= Absent 2=Present

B. WAXY BLOOM

[1] 1=Absent 2=Present

C. HAIRINESS (last internode of rachis)

[1] 1=Absent 2=Present

D. INTERNODE (SPECIFY NUMBER)

[1] 1= Hollow 2=Semi-solid 3=Solid

E. PEDUNCLE

[2] 1=Absent 2=Present

[29] cm Length

11. HEAD (at Maturity):

A. DENSITY

[1] 1=Lax 2=Middense 3= Dense

B. SHAPE

[4] 1 = Tapering 2= Strap 3 = Clavate 4 = Other (SPECIFY): Fusiform

C. CURVATURE

[2] 1 = Erect 2 = Inclined 3 = Recurved

D. AWNEDNESS

[4] 1 = Awnless 2 = Apically Awnletted 3 = Awnletted 4 = Awned

12. GLUMES (at Maturity):

A. COLOR

[1] 1 = White 2 = Tan

3 = Other (SPECIFY) : _____

B. SHOULDER

[5] 1 = Wanting 2 = Oblique 3 = Rounded 4 = Square 5 = Elevated 6 = Apiculate

C. BEAK

[3] 1 = Obtuse 2 = Acute 3 =Acuminate

D. LENGTH

[2] 1 = Short (ca. 7mm) 2 = Medium (ca. 8mm) 3 = Long (ca. 9mm)

12. GLUMES (at Maturity) *Continued*:

E. WIDTH

[2] 1 = Narrow (ca. 3mm) 2 = Medium (ca. 3.5mm) 3 = Wide (ca. 4mm)

13. SEED:

A. SHAPE

[1] 1 = Ovate 2 = Oval 3 = Elliptical

B. CHEEK

[1] 1=Rounded 2=Angular

C. BRUSH

[1] 1=Short 2=Medium 3=Long

[1] 1 = Not Collared 2 = Collared

D. CREASE

[1] 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

[2] 1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

E. Color

[1] 1=White 2= Amber 3= Red
4= OTHER (Specify)

G. PHENOL REACTION *(see instructions)*:

[4] 1 = Ivory 2 = Fawn
3 = Light Brown 4 = Dark Brown
5 = Black

F. TEXTURE

[2] 1=Hard 2=Soft

14. DISEASE: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

[0] Stem Rust *(Puccinia graminis* f. sp. *tritici)*

[2] Stripe Rust *(Puccinia striiformis)*

[0] Tan Spot *(Pyrenophora tritici-repentis)*

[0] Halo Spot *(Selenophoma donacis)*

[0] *Septoria nodorum* (Glume Blotch)

[0] *Septoria avenae* (Speckled Leaf Disease)

[0] *Septoria tritici* (Speckled Leaf Blotch)

[0] Scab (*Fusarium* spp.)

[3] Leaf Rust *(Puccinia recondita* f. sp. *tritici)*

[0] Loose Smut *(Ustilago tritici)*

[0] Flag Smut *(Urocystis agropyri)*

[0] Common Bunt *(Tilletia tritici* or *T. laevis)*

[0] Dwarf Bunt *(Tilletia controversa)*

[0] Karnal Bunt *(Tilletia indica)*

[0] Powdery Mildew *(Erysiphe graminis* f. sp. *tritici)*

[0] "Snow Molds"

14. Disease *(Continued)* (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

200100257

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

0	"Black Point" (Kernel Smudge)	0	Common Root Rot *(Fusarium, Cochliobolus* and *Bipolaris* spp.*)*
0	Barley Yellow Dwarf Virus (BYDV)	1	Rhizoctonia Root Rot *(Rhizoctonia solani)*
0	Soilborne Mosaic Virus (SBMV)	0	Black Chaff *(Xanthomonas campestris* pv. *translucens)*
0	Wheat Yellow (Spindle Streak) Mosaic Virus	0	Bacterial Leaf Blight *(Pseudomonas syringae* pv. *syringae)*
0	Wheat Streak Mosaic Virus (WSMV)		Other (SPECIFY)
	Other (SPECIFY)		Other (SPECIFY)
	Other (SPECIFY)		Other (SPECIFY)
	Other (SPECIFY)		Other (SPECIFY)

15. INSECT: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

4	Hessian Fly *(Mayetiola destructor)*		Other (SPECIFY)
1	Stem Sawfly *(Cephus* spp.)		Other (SPECIFY)
0	Cereal Leaf Beetle *(Oulema melanopa)*		Other (SPECIFY)
1	Russian Aphid *(Diuraphis noxia*		Other (SPECIFY)
0	Greenbug *(Schizaphis graminum)*		Other (SPECIFY)
0	Aphids		Other (SPECIFY)

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS

EXHIBIT D – OPTIONAL SUPPORTING INFORMATION

Milling and Baking Quality:

The end-use quality performance of Zak is compared with soft white spring wheat varieties Alpowa, Wawawai and Vanna through t-test analyses (Table D1). The grain test weight of Zak is lower than those of Alpowa and Wawawai, similar to that of Penawawa, and higher than that of Vanna. The grain protein concentration of Zak is lower (better) than that of Wawawai, similar to those of Alpowa and Penawawa, and higher (poorer) than that of Vanna. The thousand kernel weight of Zak is heavier than that for Alpowa, Penawawa and Vanna, but lighter than that for Wawawai. The flour yield of Zak is higher than those of Alpowa and Penawawa, similar to that of Wawawai, and lower than that of Vanna. Zak has a higher break flour yield than Alpowa, Penawawa and Wawawai, but lower than that for Vanna. The flour ash content of Zak is lower (better) than that of Penawawa, but higher (poorer) than those for Alpowa, Vanna and Wawawai. The milling score for Zak is higher (better) than that for Penawawa, similar to that for Alpowa and lower than those for Vanna and Wawawai. The flour protein concentration of these varieties is similar. The flour swelling volume of Zak is lower than those for Alpowa, Penawawa and Vanna, and is similar to that for Wawawai. Zak has a significantly lower RVA than all of the check varieties. Mixograph water absorption rates for Zak are lower (better) than those for Alpowa and Wawawai, and similar to those for Penawawa and Vanna. Zak has a larger (better) cookie diameter than Alpowa, Penawawa and Wawawai, and is similar to Vanna. Sponge cake volume of Zak is higher (better) than that for Wawawai, and is similar to those for Penawawa and Vanna.

In general, Zak has excellent grain and milling properties. Of particular note is its superior cookie diameter and high break flour yield. Its milling performance is substantially better than that of Penawawa, and is similar or better than the milling performance of other check varieties.

Table D1: Mean, least significant difference (LSD), probability level (P-value) and number of pairwise comparisons made (N) in t-test analyses for various milling and baking characteristics between Zak and check varieties.

Variety	Test Weight (lb/bu)	Grain Protein (%)	Grain Hardness	Thousand Kernel Wt. (g)	Flour Yield (%)	Break Flour Yield (%)	Flour Ash (%)	Milling Score	Flour Protein (%)	Flour Swelling Volume (cc/g)	Flour RVA cP/12	Mixograph Water Absorption (%)	Cookie Diameter (cc)	Sponge Cake Volume (cc)
Zak	62.3	10.5	22*	39.4*	70.0*	49.2*	0.37	86.5	8.9	22.1	145	52.5*	9.6*	na
Alpowa	63.1*	10.4	19	37.9	68.3	46.8	0.35*	85.4	8.7	24.1*	207*	53.5	9.3	na
LSD	0.5	0.4	2	1.1	0.7	0.9	0.02	1.3	0.4	0.7	13.0	0.9	0.1	na
P-value	<0.01	0.81	<0.01	0.02	<0.01	<0.01	0.04	0.10	0.51	<0.01	<0.01	0.04	0.13	na
N	18	18	18	18	12	12	12	12	12	10	10	12	12	na
Zak	62.3	10.3	18	38.8*	69.5*	52.7*	0.37*	85.8*	8.5	22.3	147	52.0	9.7*	1295
Penawawa	62.3	10.5	19	35.5	67.1	48.8	0.40	80.8	8.9	28.1*	253*	52.2	9.4	1283
LSD	0.40	0.4	2	1.2	1.0	0.9	0.02	1.7	0.5	0.6	9	1.0	0.1	95
P-value	0.89	0.13	0.41	<0.01	<0.01	<0.01	<0.01	<0.01	0.22	<0.01	<0.01	0.61	0.12	0.34
N	18	18	18	18	12	12	12	12	12	12	12	12	12	2
Zak	62.5*	10.4	21	38.6*	69.1	52.4	0.40	84.5	7.9	21.9	140	53.3	9.6	1291
Vanna	62.1	10.1*	11	34.9	70.4*	53.9*	0.38*	87.2*	7.8	22.9*	174*	53.1	9.6	1275
LSD	0.3	0.2	2	1.2	0.5	0.6	0.01	1.2	0.2	0.4	7	0.6	0.1	29
P-value	0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.34	<0.01	<0.01	0.55	0.09	0.25
N	21	21	21	21	15	15	16	15	16	16	16	16	9	11
Zak	62.9	10.0*	18	40.5	69.1	48.9*	0.36	85.9	7.9	22.6	140	52.7*	9.5*	1295*
Wawawai	64.0*	10.7	24	45.1*	68.9	46.1	0.32*	88.5*	8.2	22.8	155*	54.3	9.4	1251
LSD	0.3	0.2	2	1.0	0.4	0.5	0.01	0.8	0.7	0.5	6	0.5	0.1	20
P-value	<0.01	<0.01	<0.01	<0.01	0.36	<0.01	<0.01	<0.01	0.54	0.38	<0.01	<0.01	0.06	<0.01
N	34	34	33	33	28	28	18	28	29	26	25	28	23	22

*Significantly different at p = 0.05
na= not available

REPRODUCE LOCALLY. Include form number and edition date on all reproductions. FORM APPROVED - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Washington State University Research Foundation	WA007850	Zak
4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	**5. TELEPHONE** *(Include area code)*	**6. FAX** *(Include area code)*
1610 NE Eastgate Blvd. Pullman, WA 99163 U.S.A.	509.335.5526	509.335.7237
	7. PVPO NUMBER	200100257

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain** [X] YES [ ]

9. Is the applicant (individual or company) a U.S. National or a U.S. based company? **If no, give name of country** [X] YES [ ] NO

10. Is the applicant the original owner? [ ] YES [X] NO **If no, please answer <u>one</u> of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

[X] YES [ ] NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

[ ] YES [ ] NO **If no, give name of country**

11. Additional explanation on ownership *(If needed, use the reverse for extra space)*:

Zak was developed by Dr. Kimberlee K. Kidwell, Spring wheat breeder and geneticist at Washington State University.

Washington State University's ownership interests were assigned to the Washington State University Research Foundation.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.